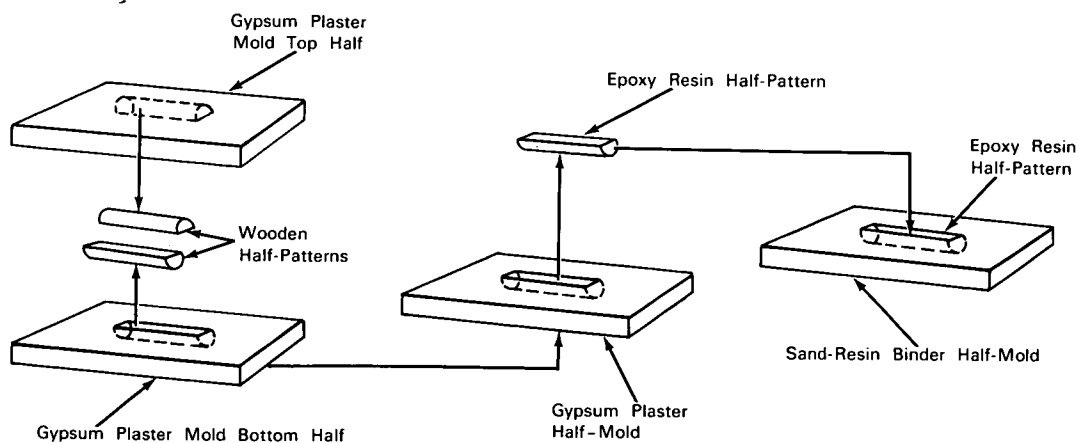


# NASA TECH BRIEF



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## Epoxy-Resin Patterns Speed Shell-Molding of Aluminum Parts



**The problem:** To provide a quick, inexpensive method of making half-patterns for casting of aluminum parts by the shell-molding process. In conventional foundry practice, metal half-patterns used for making the half-shells or half-molds must be carefully machined to obtain castings of the desired dimensional tolerances and surface finish. Time and money would be saved if this machining operation could be eliminated.

**The solution:** Casting the half-patterns from a commercial epoxy resin containing aluminum powder. These half-patterns are cast in plaster molds of the original wooden pattern.

**How it's done:** The wooden half-patterns coated with a release agent are covered with a commercially available low-expansion gypsum molding plaster. After the plaster molds have set (15 to 30 minutes), they are released from the patterns and dried at approximately 120°F for a time depending on mold thickness. The molds are then coated with a suitable

release agent. In the next step, an epoxy resin containing aluminum powder is heated to 150° to 160°F and thoroughly mixed with a hardener. This plastic mixture is then poured into the plaster molds. After oven-curing of the assemblies for 4 hours at 200° to 300°F, the epoxy half-patterns are removed from the molds (which are usually destroyed) and cured for 6 hours at 400°F. Half-molds of sand-resin binder mixture may now be made by dropping the mixture on the epoxy patterns and slowly heating for 5 minutes to bring the temperature up to about 350°F. Finished castings are made by pouring molten aluminum into the two matched sand-resin half-molds.

### Notes:

1. At least ten serviceable sand-resin molds can be made from each epoxy pattern. Aluminum castings made in these molds had a surface roughness of less than 0.1 mil.
2. No shrink corrections are needed in making the wooden patterns, since dimensional changes in the

(continued overleaf)

plaster mold are negligible and thermal expansion of the aluminum-filled epoxy resin is close to that of the aluminum casting.

3. Inquiries concerning this invention may be directed to:

Technology Utilization Officer  
Marshall Space Flight Center  
Huntsville, Alabama, 35812  
Reference: B65-10177

**Patent status:** NASA encourages the immediate commercial use of this invention. It is owned by NASA and inquiries about obtaining royalty-free rights for its commercial use may be made to NASA, Code AGP, Washington, D.C., 20546.

Source: University of Alabama under contract  
to Marshall Space Flight Center  
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